REMARKS

Claims 9, 10 and 12 have been canceled. Thus, claims 1, 2, 7, 8, 14 and 15 are pending in the present application for further prosecution. Claim 1 has been amended to overcome rejections based on §112 and arguments are submitted in support of the patentability of the claims over the prior art of record. No new matter was added. Accordingly, Applicants respectfully request reconsideration of the rejections and respectfully submit that claims 1, 2, 7, 8, 14 and 15 are in condition for allowance.

I. Claim Rejection – 35 USC §112, First Paragraph

A. In the FINAL Office Action dated October 27, 2011, claim 13 is rejected under 35 USC §112, first paragraph, as failing to comply with the written description requirement.

Claim 13 was canceled via Applicants previously filed Amendment. Thus, this rejection is believed to be moot and to not apply to any claim currently pending in the present application. Accordingly, Applicants respectfully submit that this rejection has been overcome and can be withdrawn.

B. In the FINAL Office Action dated October 27, 2011, claims 1, 2, 7-10, 12, 14 and 15 are rejected under 35 USC §112, first paragraph, as failing to comply with the enablement requirement.

The limitation directed to overall purity of the copper has been eliminated from the claims, as amended. Accordingly, Applicants respectfully submit that the claims, as amended, are enabled by the specification, as filed.

The method of producing the high purity copper is disclosed on pages 4-7 of the present application, as filed, and includes an example (Example 1, see pages 5-7). The residual resistance ratio is disclosed in Table 1, page 6, and the process used to measure the residual

resistance ratio is discussed on page 7, lines 8-10, for Example 1. The content of each of Ag, Al, and Fe for Example 1 is disclosed in Table 1, page 6, of the present application, as filed.

With respect to the subject matter of claims 2 and 8, see page 3, lines 5-6, of the present application, as filed. With respect to the subject matter of claim 7, see pages 4, 5 and 7 of the present application, as filed. With respect to the subject matter of claim 14, see Table 1, page 6, of the present application, as filed. With respect to the subject matter of claim 15, see page 8, lines 9-19, of the present application, as filed.

Accordingly, Applicants respectfully submit that the claims, as amended, and specification, as filed, fully comply with the requirements of 35 USC §112, first paragraph. Applicants respectfully request reconsideration and removal of the rejection.

II. Claim Rejection – 35 USC §103(a)

A. In the FINAL Office Action dated October 27, 2011, claims 1, 2, 7-10 and 12 are rejected under 35 USC §103(a) as being obvious in view of the 1995 publication of Fujiwara et al. titled "Ductility of Ultra High Purity Copper"

Claim 1 of the present application, as amended, requires an ultrahigh purity copper having Ag content less than 0.005 ppm, Al content less than 0.001 ppm, and Fe content of less than 0.001 ppm.

In contrast, Table 1 of Fujiwara et al. discloses "8N-Cu" having Ag content of 0.011 mass ppm, Al content of 0.003 mass ppm, and Fe content of 0.002 mass ppm.

Accordingly, the ultrahigh purity copper of claim 1 of the present invention is clearly superior in terms of impurity content of Ag, Al and Fe in comparison to the "8N-Cu" of Fujiwara et al., and no motivation is provided by Fujiwara et al. for the further purification of these specific impurities. In particular, a considerable amount of silver is contained in copper raw

material. In the present invention, the Ag content is able to be reduced to less than 0.005 ppm; whereas the "8N-Cu" of Fujiwara et al. has 0.011 ppm. Thus, the disclosure of Fujiwara et al. is deficient with respect to the required Ag, Al and Fe content of the ultrahigh purity copper required by claim 1 of the present application. For this reason, Applicants respectfully submit that claim 1 is patentable and not obvious in view of the Fujiwara et al. publication.

It should be further noted that "mass ppm" of Fujiwara et al. and "wt ppm" of the present application are not different. "Mass ppm" and "wt ppm" are substantially the same unit for representing the concentration. Accordingly, Applicants respectfully submit that the impurity contents of each of Ag, Al and Fe of Fujiwara et al. can simply be compared to that of the present application.

It should further be noted that ultrahigh purity copper possesses characteristics that are different from ordinary copper. For example, recrystallization temperature of ultrahigh purity copper is low, and ultrahigh purity copper is soft and hardly becomes brittle even in middle temperature ranges and has superior workability. In addition, ultrahigh purity copper has low electrical resistance at ultralow temperatures and has high thermal conductivity. Moreover, ultrahigh purity copper is also characterized in that its characteristics are enormously affected by impurity contamination. The present invention yields superior effects in a material known as ultrahigh purity copper having the foregoing unique characteristics by preparing a sputtering target using such ultrahigh purity copper that was obtained by further reducing impurity contamination, stabilizing the deposition characteristics and deposition conditions upon sputtering the foregoing sputtering target, and considerably reducing the number of particles in comparison to conventional technology. These effects are not obvious from Fujiwara et al. and no motivation for providing such effects are provided to one of ordinary skill in the art from the

Fujiwara et al. publication. For this additional reason, Applicants respectfully submit that claim 1 is patentable and not obvious in view of the Fujiwara et al. publication.

Still further, the ultrahigh purity copper required by claim 1 of the present application requires a residual resistance ratio of 40,000-100,000. While the residual resistance ratio is affected to some degree by purity, it is also a fact that the residual resistance ratio is not solely dependent on purity. As asserted in Applicants last Amendment, the residual resistance ratio is certainly affected to a great degree by the crystal structure of the material. When there are few crystal defects and when the crystal grain size is small, that is, when it is of a superior crystal structure, the value of residual resistance ratio will increase. When the residual resistance ratio is great, the existence of crystal defects (rearrangement, pores, etc.) is few. Accordingly, even if the purity of two samples of ultrahigh purity copper is of a similar level, it does not necessarily mean that the same level of residual resistance ratio is obtained.

Accordingly, Applicants respectfully submit that it is an error to blindly conclude that the residual resistance ratio of the "8N-Cu" sample of Fujiwara et al. is 40,000 to 100,000. Moreover, when considering that the "8N-Cu" sample of Fujiwara et al. has greater impurity contents for each of Ag, Al and Fe than the present invention, it would certainly be inappropriate to conclude that the residual resistance ratio value of Fujiwara et al. would be at a level of 40,000. As stated above, the characteristics of ultrahigh purity copper is enormously affected by impurity contamination.

The present invention has a residual resistance ratio of 40,000 to 100,000 and few crystal defects and yields superior effects of being able to inhibit the generation of particles when the material is provided in the form of a sputtering target during sputtering. With respect to this point, Fujiwara et al. fail to disclose or even suggest residual resistance ratio or the structure of a

sputtering target. Thus, the present invention should not be considered obvious from the Fujiwara et al. publication.

For all the above reasons, Applicants respectfully submit that claims 1, 2, 7 and 8 are patentable and not obvious in view of the Fujiwara et al. publication. Accordingly, Applicants respectfully request reconsideration and removal of the rejection of claims 1, 2, 7 and 8.

B. In the FINAL Office Action dated October 27, 2011, claims 1, 2, 7-11, 14 and 15 are rejected under 35 USC §103(a) as being obvious over Fujiwara et al. in view of U.S. Patent No. 5,206,430 issued to Itoh et al.

Purification of materials using activated carbon may be known. Nevertheless, the means for purification should be determined as being different dependent upon the material to be purified, the elements to be removed, the purity level to be achieved, and the like.

Itoh et al. disclose the removal of heavy metal element impurities from cinnamic acids and purifying the cinnamic acids to a level of 98.6% to 99.9%. Based on this teaching, it would not be obvious for one of ordinary skill in the art to obtain ultrahigh purity copper having a residual resistance ratio of 40,000 to 100,000 and impurity contents of Ag, Al and Fe (light metals) of less 0.005, 0.001 and 0.001 ppm, respectively. Itoh et al. clearly fails to teach or provide a motivation for providing an ultrahigh purity copper, for reducing light metals from the ultrahigh purity copper to the above stated levels, and for providing the ultrahigh purity copper with the above stated level of residual resistance ratio.

Moreover, Applicants respectfully submit that Itoh et al. fails to teach that the purity can be controlled as intended by changing the additive amount of activated carbon. Further, Applicants respectfully disagree that it would be obvious for one of ordinary skill in the art to improve the purification of the "8N-Cu" sample disclosed by Fujiwara et al. by using the activated carbon of Itoh et al. since the purification method of Fujiwara et al. is not disclosed.

There is no way to conclude that the process of Itoh et al. would actually further purify the "8N-Cu" sample of Fujiwara et al. produced by an unknown process. There is a greater likelihood that the "8N-Cu" sample would have reduced impurity considering Itoh et al.'s process provides only 98.6% to 99.9% purity. Applicants respectfully submit that the conclusion of increased purity is in error, is unsupported, and likely impossible given the difference in materials and purity levels.

For these reasons, Applicants respectfully request reconsideration and removal of the rejection of claims 1, 2, 7, 8, 14 and 15 as obvious over Fujiwara et al. in view of the Itoh et al. patent.

III. Conclusion

In view of the above amendments and remarks, Applicants respectfully submit that the rejections have been overcome and that the present application is in condition for allowance. Thus, a favorable action on the merits is therefore requested.

Please charge any deficiency or credit any overpayment for entering this Amendment to our deposit account no. 08-3040.

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